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MAC 2312 Quiz 4
Thursday January 25th

Find the area enclosed by the graphs of $y = x^2$ and $y = 2x$.

Intersection points? $x^2 = 2x \Rightarrow x^2 - 2x = 0$

$$\Rightarrow x(x-2) = 0 \Rightarrow x=0, x=2.$$

Which is top curve, which is bottom curve? Try test input $x=1$.
 $x^2 = 1^2 = 1$, $2x = 2 \cdot 1 = 2$. $2x \rightarrow$ bigger output, top curve
 $x^2 \rightarrow$ smaller output, bottom curve

$$\text{Area} = \int_{x=0}^{x=2} \underbrace{(\text{top} - \text{bottom})}_{\text{height}} \underbrace{dx}_{\text{width}} = \int_0^2 (2x - x^2) dx$$

$$= \left[x^2 - \frac{x^3}{3} \right]_0^2 = \left(2^2 - \frac{2^3}{3} \right) - \underbrace{\left(0^2 - \frac{0^3}{3} \right)}_{0-0=0}$$

$$= 4 - \frac{8}{3} = \frac{12}{3} - \frac{8}{3}$$

$$= \boxed{\frac{4}{3}}$$